JPEG 2000

National Geospatial-Intelligence Library 4.0 &
Image Product Library 4.0 Implementation

NGL 4.0/4.1 & IPL 4.0 JPEG 2000

- NGL 4.0/IPL 4.0 Ingests NITF 2.1 file containing JPEG 2000 (J2k) compressed Images or Spatial Chips
  - Each Image is Compressed with
    - Either the Visually Lossless (VL) or Numerically Lossless (NL) Algorithm
    - Up to 20 Image Quality (or Bit Rate) Layers
    - Up to 6 RSETs (R0-R5) encoded in the J2k codestream
    - 1024 x 1024 Tiles, with no padding of partial tiles
    - J2k Codestream formatted as NGA Preferred J2k Encoding (NPJE)
      - Single Tile Part, Quality Layer Based format (LRCP)
      - Optimum for Library functions e.g., chipping, RSET extraction, etc.
- NGL 4.0/IPL 4.0 Creates J2k Compressed Browse Images
  - Overview and Thumbnail images compressed with VL Algorithm
  - Overview codestream contains R0-R5 and 2 Quality Layers (0,1)
    - Thumbnail is created by extracting R2 from the Overview image codstream
  - Overview image codestream is Bit Rate Limited to 0.5 bits/pixel
  - IPL 4.0 will have a site selectable option to produce Browse images compressed in JPEG 8 (JFIF) instead of J2k

NGL 4.0/4.1 & IPL 4.0 JPEG 2000

- NGL 4.0/IPL 4.0 Exports J2k Compressed Full Images or Spatial Chips
  - Spatial Chips
    - Chips are produced by Parsing the J2k tiles from the original J2k codestream without decompressing the original image
  - At Full Quality (All Quality Layers) or at Bit Rate Reduced (fewer quality layers)
    - Bit Rate Reductions are produced by Parsing Quality Layers from the original J2k codestream without decompressing the original image
    - NGL 4.0 will provide products in four Bit Rate Reduced versions e.g., 1.3 b/p, 2.3 b/p, etc.
  - At Highest Resolution (R0) or Reduced Resolution (R1-R9)
    - RSETs R1-R5 are produced by Parsing J2k Resolution Packets from the original J2k codestream without decompressing the original image
      - NGL 4.0 will provide RSETs R5 – R1; user selectable
      - Highest resolution RSET will be bit rate limited to 4.3 bpp (approximately)
    - NGL 4.0/IPL 4.0 Exports R6-R9 Uncompressed in NITF 2.1 file format, produced from decompressed R5, parsed from original J2k codestream

NGL 4.0/4.1 & IPL 4.0 JPEG 2000

- NGL 4.0/IPL 4.0 Will Decompress J2k (VL or NL) and Export
  - Will export decompressed imagery in NITF 2.1, Sun Raster, or TIFF 6.0 file formats
- NGL 4.0/IPL 4.0 Will Not Compress products made from decompressed FIA images or uncompressed FIA images
- GeoScout-led Study determined optimal J2k Encoding Format for exports of FIA images to IEC without degradation of IEC performance requirements
  - Exploitation Preferred J2k Encoding (EPJE)
    - Resolution Ordered with Multiple Tile Parts – RTLCP
    - Allows IEC to rapidly decompress and roam through an image at any resolution (RSET)
  - NGL 4.0/IPL 4.0 Will Transcode all products from NPJE to EPJE upon Export to IEC
    - No Decompression required – just a reordering of the J2k codestream layout
    - No change to image quality – Decoding produces exactly the same pixel values, whether from NPJE or EPJE format, in exactly the same pixel location